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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/782,925	02/23/2004	Masaki Aizawa	HITA.0522	7532

7590 08/23/2005

REED SMITH LLP  
Suite 1400  
3110 Fairview Park Drive  
Falls Church, VA 22042

EXAMINER

LE, DIEU MINH T

ART UNIT	PAPER NUMBER
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2114

DATE MAILED: 08/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/782,925

**Applicant(s)**

AIZAWA ET AL.

**Examiner**

Dieu-Minh Le

**Art Unit**

2114

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 02/23/04 & 04/18/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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1. This Office Action is response to the communication filed on 04/18/05 in application 10/782,925.

2. Claims 1-20 are presented for examination.

3. The abstract of the disclosure is objected to because the abstract lines are crowded too closely together, making reading difficult [i.e. lines 3, 6-7, 12-13]. Correction is required. See MPEP § 608.01(b).

4. The claims are objected to because the words are crowded too closely together, making reading difficult. For example; claim 1, lines 4, 7, 13, 18, 23-29. Substitute claims with spacing between words and lines one and one-half or double spaced on good quality paper are required. See 37 CFR 1.52(b).

**Claim Rejections - 35 USC § 103**

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102

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of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kakuta et al. (U.S. Patent 5,579,474 hereafter referred to as Kakuta) in view of Sasamoto et al. (U.S. Patent 6,442,711 hereafter referred to as Sasamoto).

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As per claim 1:

Kakuta explicitly teach the invention. Kakuta teaches:

- A disk array system [abstract, fig. 1, col. 1, lines 17-20; col. 2, lines 14-23]

Comprising:

- a channel adapter for controlling data transfer with respect to a host device [fig. 1, col. 4, lines 39-41];
- a plurality of data disk drives configuring a RAID group [fig. 1, col. 2, lines 25-37];
- at least one spare disk drive provided as a spare for the data disk drives [col. 6, lines 47-58];
- a disk adapter for controlling data transfer with respect to the data disk drives and the spare disk drive [col. 4, lines 53-62; col. 7, lines 34-41; col. 8, lines 6-19; col. 17, line 66 through col. 18, line 8];
- a cache memory used by the channel adapter and the disk adapter for storing data; [col. 4, lines 53-62; col. 7, lines 34-41; col. 8, lines 6-19; col. 17, line 66 through col. 18, line 8];
- a control memory used by the channel adapter and the disk adapter for storing control information [fig. 1, col. 4, lines 18-30; col. 7, lines 27-57];

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- a backup storage provided separately from the data disk drives and the spare disk drive [col. 6, lines 47-58];
- observing occurrence of access error with respect to the data disk drives, when the frequency of occurrence of the access error exceeds a predetermined threshold, copying data stored in the data disk drive exceeding the threshold in the spare disk drive via the cache memory; [col. 19, lines 10-13 and lines 31-41; col. 20, lines 42-53; and col. 21, lines 4-13];
- processing access request directed to the RAID group during the copying process by the first control unit, making the backup storage take over a write request directed to the RAID group [fig. 1, col. 2, lines 25-37; col. 19, lines 31-41; col. 21, lines 4-13];
- copying data written in the backup storage to the data disk drives and the spare disk drive other than the data disk drive exceeding the threshold when the copying process by the first control unit is finished [fig. 1, col. 19, lines 10-13 and lines 31-41; col. 20, lines 42-53; and col. 21, lines 4-13].

Kakuta does not explicitly teach:

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- a first control unit, a second control unit, and a third control unit.

However, Kakuta does disclose capability of:

- A disk array system of RAID used for improving the system performance [abstract, fig. 1, col. 1, lines 18-20]

comprising:

- *disk array controller used to performing the error detection and correction as well as a connectivity among adapter, channel interfaces, plurality of disks, cache memory, channel switch, etc...to support data copying, data read/write via predetermined value (i.e., threshold) [fig. 1, 8-9, col. 4, lines 18-30; col. 19, lines 10-13 and lines 31-41; col. 20, lines 42-53; and col. 21, lines 4-13].*

In addition, Sasamoto explicitly teaches:

- A method system and method for avoiding storage failures in a storage array system[abstract, fig. 1-3, col. 1, lines 10-16] comprising:

- *control unit to perform storing data, calculating data, judging data, execution data, etc... in supporting error detection and correction process under threshold value limitation [fig. 3, col. 7, lines 20-61].*

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Therefore, it would have been obvious to a person having ordinary skill in the art at the time of Applicant's invention was made to first realizing Kakuta's **disk array controller used to performing the error detection and correction as well as a connectivity among adapter, channel interfaces, plurality of disks, cache memory, channel switch, etc...to support data copying, data read/write via predetermined value (i.e., threshold)** as being the first control unit, second control unit, and third control unit as claimed by Applicant. This is because Kakuta explicitly deals with the storage high performance operation via plurality of RAID disks. Therefore, multi-control units are a must in order to ensuring data received and transmitted correctly to and from switch, caches, and other communication devices; second, by applying **control unit to perform storing data, calculating data, judging data, execution data, etc... in supporting error detection and correction process under threshold value limitation** as taught by Sasamoto in conjunction with the disk array system of RAID used for improving the system performance as disclosed by Kakuta, the disk array or fault tolerant disk array system can enhance its operation performance, more specifically to ensuring the error thoroughly detected and corrected via control units via access controlling, data copying, and judgment capabilities.



This modification would have been obvious because a person having ordinary skill in the art would have been motivated to do so to improve the disk array system operation availability and network/system performance therein with a mechanism to enhance the data security, data debugging, data reliability, and data throughput which eventually will increase its performance, such as data throughput between internal and external devices.

As per claims 2, 3 and 4:

Kakuta further explicitly teaches:

- read request directed to the data disk drive exceeding the threshold based on the data stored in the data disk drives other than the data disk drive exceeding the threshold [col. 7, lines 58 through col. 8, lines 5; col. 11, lines 16-33; col. 14, lines 30-38; col. 17, lines 35-50];
- read request directed to the data disk drives other than the data disk drive exceeding the threshold based on data copied in the backup storage [col. 7, lines 58 through col. 8, lines 5; col. 11, lines 16-33; col. 14, lines 30-38; col. 17, lines 35-50];

Kakuta does not explicitly teach:

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- the second control unit is associated with differential management information for controlling data written.

However, Kakuta does disclose capability of:

- *change information for reading/writing data to and from memory under control unit [col. 7, lines 42-57; col. 8, lines 56-66].*

In addition, Sasamoto explicitly teaches:

- A method system and method for avoiding storage failures in a storage array system[abstract, fig. 1-3, col. 1, lines 10-16] comprising:
  - *information changes from read/write request base on threshold valuation limitation(i.e., exceeds or not exceeds) [col. 5, lines 36-60].*

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of Applicant's invention was made to first realizing Kakuta's *change information for reading/writing data to and from memory under control unit* as being the second control unit is associated with differential management information for controlling data written as claimed by Applicant. This is because Kakuta explicitly applied changed

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information to enhance the storage performance operation via plurality of RAID disks; second, by applying *information changes from read/write request base on threshold valuation limitation(i.e., exceeds or not exceeds)* as taught by Sasamoto in conjunction with the disk array system of RAID used for improving the system performance as disclosed by Kakuta, the disk array or fault tolerant disk array system can smooth its backup operation performance, more specifically to ensuring the error thoroughly detected and corrected via control units via access controlling, data copying, and judgment.

This modification would have been obvious because a person having ordinary skill in the art would have been motivated to do so to improve the disk array system operation availability and network/system performance therein with a mechanism to enhance storage backup, storage access performance and throughput.

As per claims 5, 6, and 7:

Kakuta further explicitly teaches:

- write request directed to the data disk drive exceeding the threshold out of write requests directed to the RAID group executed by the backup storage, and makes the write request directed to the each disk drive other than the data disk drive exceeding the threshold executed by the

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corresponding data disk drive [col. 2, lines 15-67; col. 17, lines 35-50];

- write request directed to the RAID group executed by the backup storage when a space more than a predetermined value is left in the backup storage and makes the write request directed to the RAID group executed by the RAID group when a space more than the predetermined value is not left in the backup storage [col. 3, lines 8-31]

- recovers data in the data disk drive exceeding the threshold based on data stored in the data disk drives other than the data disk drive exceeding the threshold, and copies the recovered data to the spare disk drive [col. 14, lines 58 through col. 15, lines 5].

Kakuta does not explicitly teach:

- the first and second control unit.

However, Kakuta does disclose capability of:

- A disk array system of RAID used for improving the system performance [abstract, fig. 1, col. 1, lines 18-20]

comprising:

- *disk array controller used to performing the error detection and correction as well as a connectivity among*

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*adapter, channel interfaces, plurality of disks, cache memory, channel switch, etc...to support data copying, data read/write via predetermined value (i.e., threshold) [fig. 1, 8-9, col. 4, lines 18-30; col. 19, lines 10-13 and lines 31-41; col. 20, lines 42-53; and col. 21, lines 4-13].*

In addition, Sasamoto explicitly teaches:

- A method system and method for avoiding storage failures in a storage array system[abstract, fig. 1-3, col. 1, lines 10-16] comprising:
  - *control unit to perform storing data, calculating data, judging data, execution data, etc... in supporting error detection and correction process under threshold value limitation [fig. 3, col. 7, lines 20-61].*
- recovers data in the data disk drive exceeding the threshold based on data stored in the data disk drives other than the data disk drive exceeding the threshold, and copies the recovered data to the spare disk drive [col. 2, lines 10-35] .

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of Applicant's invention was made to realize Kakuta's **disk array controller used to**

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*performing the error detection and correction as well as a connectivity among adapter, channel interfaces, plurality of disks, cache memory, channel switch, etc...to support data copying, data read/write via predetermined value (i.e., threshold) and Sasamoto's control unit to perform storing data, calculating data, judging data, execution data, etc... in supporting error detection and correction process under threshold value limitation do teach applicant's invention. This is because both deals with the storage high performance operation via plurality of RAID disks to ensuring the error thoroughly detected and corrected via control units via access controlling, data copying, and judgment capabilities for the same reasons set forth as described in claim 1, *supra*.*

As per claim 8:

Kakuta further explicitly teaches:

- a manual instruction unit for making execute copying process is provided [fig. 1, col. 10, lines 66 through col. 11, lines 15 and col. 17, line 66 through col. 18, line 8].

As per claim 9:

Kakuta further explicitly teaches:

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- perform multiple operations, and the backup storage accepts write requests directed to each of the plurality of RAID groups [fig. 1, col. 2, lines 25-37; col. 4, lines 53-62; col. 7, lines 34-41; col. 8, lines 6-19; col. 13, lines 25-39; col. 17, line 66 through col. 18, line 8].

As per claim 10:

Kakuta further explicitly teaches:

- the backup storage can be implemented as at least one of another RAID groups having the same configuration as the RAID group described above, a logical volume, or a disk drive; [fig. 1, col. 2, lines 25-37; col. 19, lines 31-41; col. 21, lines 4-13];

In addition, Sasamoto explicitly teaches:

- A method system and method for avoiding storage failures in a storage array system [abstract, fig. 1-3, col. 1, lines 10-16] comprising:

- *control unit to perform storing data, calculating data, judging data, execution data, etc... in supporting error detection and correction process under threshold value limitation [fig. 3, col. 7, lines 20-61].*

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- a connectivity among RAIDs, control unit, host computer, etc... in supporting the error failure detection and correction [col. 3, lines 8-49].

As per claim 11-16:

Due to the similarity of claims 11-16 to claims 1-10 except for a method of avoiding failure of a disk array system comprising first step of observing access error, second step of copying data, third step of associating the RAID, etc... instead of a disk array system comprising first control unit for observing access error, second control unit associated with differential management information the RAID, third control for copying data etc... therefore, this claim is also rejected under the same rationale applied against claims 1-10. **In addition, all of the limitations have been noted in the rejection as per claims 1-10.**

As per claim 17-20:

Due to the similarity of claims 17-20 to claims 1-10 except for a method of using a disk drive in a disk array system comprising fault drive detecting step for observing access error, data copying step for copying data, processing step for data recovery and configuration associating the RAID, etc...



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instead of a disk array system comprising first control unit for observing access error, second control unit associated with differential management information the RAID, third control for copying data etc.. therefore, this claim is also rejected under the same rationale applied against claims 1-10. **In addition, all of the limitations have been noted in the rejection as per claims 1-10.**

**Priority**

8. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 11/26/2003. It is noted, however, that applicant has not filed a certified copy of the JP 2003-395322 application as required by 35 U.S.C. 119(b) .

**Conclusion**

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

10. A shortened statutory period for response to this action is set to expired THREE (3) months, ZERO days from the date of this letter. Failure to respond within the period for response will cause the application to be abandoned. 35 U.S.C. 133.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dieu-Minh

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Le whose telephone number is (571) 272-3660. The examiner can normally be reached on Monday - Thursday from 8:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Beausoliel can be reached on (571)272-3645. The Tech Center 2100 phone number is (571) 272-2100. The Central FAX number is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



**DIEU-MINH THAI LE  
PRIMARY EXAMINER  
ART UNIT 2114**

DML  
8/17/05